

## APPENDIX D

### THUNDERSTORMS - LIGHTNING AND HAIL

#### TABLE OF CONTENTS

Thunderstorms - Lightning and Hail Overview	2
Lightning Casualties and Damages	3
Lightning Events in Beagle County	4
Hail Days Per Year	5
Hail Events in Beagle County	6

## Thunderstorms -Lightning and Hail Overview

The National Weather Service estimates that over 100,000 thunderstorms occur each year on the U.S. mainland. Approximately 10 percent are classified as "severe." Thunderstorms can produce tornadoes, hailstorms, and extreme winds. The NWS classifies a thunderstorm as severe if its winds reach or exceed 58 mph," it produces a tornado, or it drops surface hail at least 0.75 inches in diameter.

Thunderstorms are responsible for significant structural damage to buildings, forest and wildfires, downed power lines and trees, and loss of life.

### Lightning

Thunderstorms and lightning are often called the "underrated killer" events of the mainland U.S. Lightning occurs during all thunderstorms and can strike anywhere. Significant thunderstorm activity occurs during different months, but mostly from spring until early winter.

NOAA reports that in 1993 lightning strikes cause 43 deaths and \$32.5 million in damage. Most lightning related deaths and injuries occur when people are outdoors during summer afternoons and evening.

### Hail

Hailstorms develop from severe thunderstorms. Although they occur in every State on the mainland, hailstorms occur primarily in the Midwestern States. Hailstorms occur more frequently during the late spring and early summer. This period coincides with the peak agricultural season. Besides crop damage, hailstorms cause damage to buildings and automobiles, but they rarely result in loss of life.

The Midwest hailstorm and tornado event in April 1004 lasted 4 days. According to Property Claims Services in Rahway, NJ, It produced 300,000 damage claims.

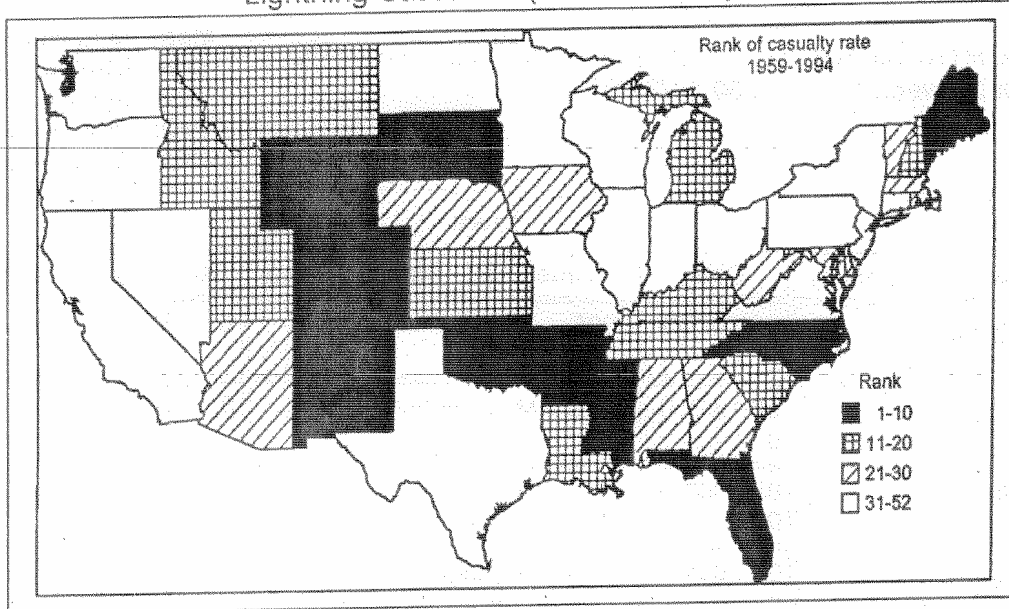
### Mitigation Approaches

Thunderstorm, windstorm, and hail mitigation approaches are similar. They include:

1. Building Codes
2. Public Awareness
3. Weather warning system improvements and modernization

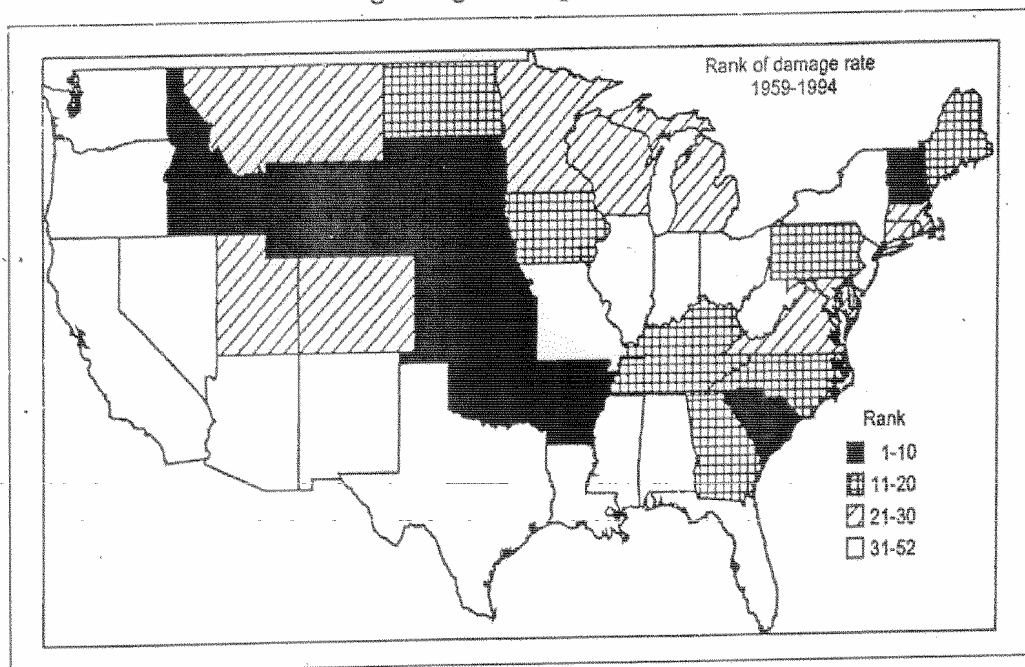
Grounding techniques for buildings have proven effective lightning mitigation.

### Lightning Casualties (Deaths and Injuries)



US map of rates of lightning casualties (deaths and injuries combined) ranked by state from 1959 to 1994

### Lightning Damage Reports



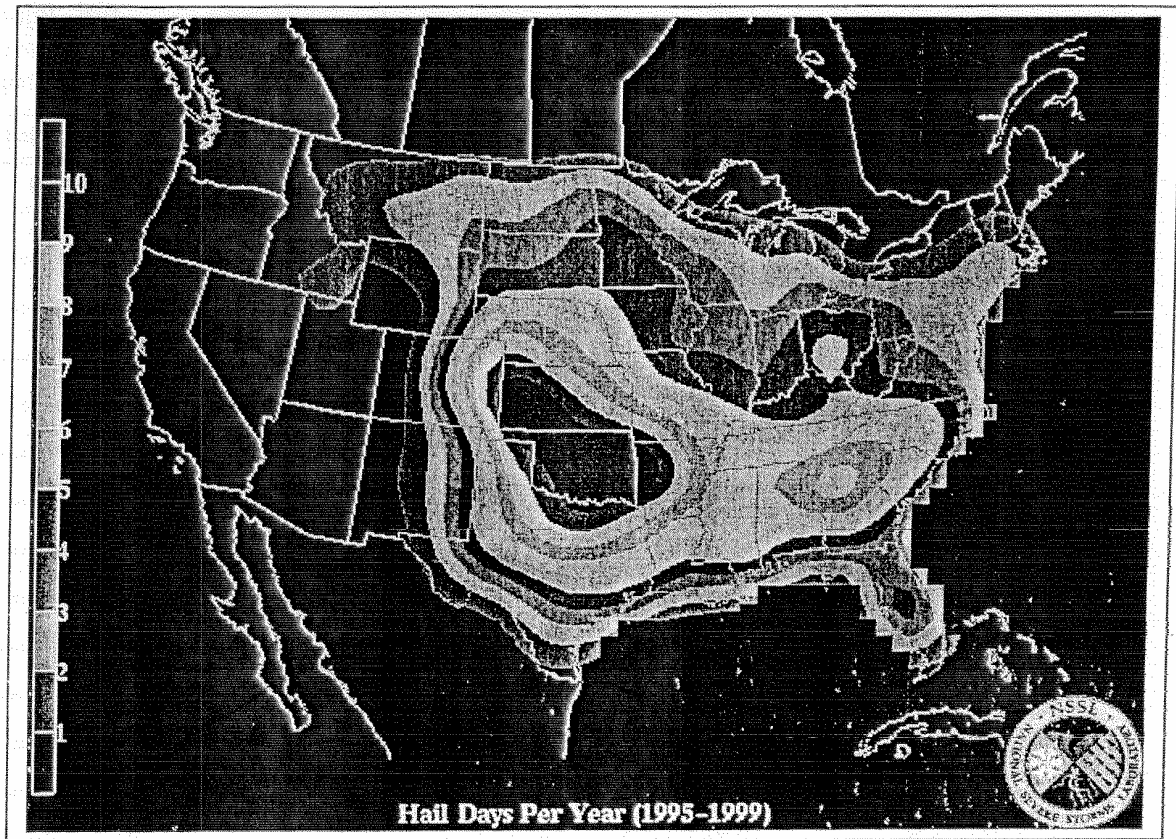
US map of rates of lightning damage reports ranked by state from 1959 to 1994

**4 LIGHTNING** event(s) were reported in **Beagle County,**  
**Iowa** between **01/01/1950** and **10/31/2002**.

**Mag:** Magnitude  
**Dth:** Deaths  
**Inj:** Injuries  
**PrD:** Property Damage  
**CrD:** Crop Damage

Iowa								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 <u>Newton</u>	04/10/1995	0925	Lightning	N/A	0	0	200K	0
2 <u>Newton</u>	06/13/2000	01:00 PM	Lightning	N/A	0	0	1K	0
3 <u>Darwin</u>	07/10/2000	05:00 AM	Lightning	N/A	0	0	1K	0
4 <u>Newton</u>	07/26/2000	09:50 AM	Lightning	N/A	0	0	12K	0
TOTALS:					0	0	214K	0

## HAIL DAYS PER YEAR



**60 HAIL** event(s) were reported in **Beagle County, Iowa** between **01/01/1950** and **10/31/2002**.

**Mag:** Magnitude  
**Dth:** Deaths  
**Inj:** Injuries  
**PrD:** Property Damage  
**CrD:** Crop Damage

Iowa								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 <u>BEAGLE</u>	09/28/1972	1330	Hail	1.75 in.	0	0	0	0
2 <u>BEAGLE</u>	06/18/1974	2210	Hail	1.75 in.	0	0	0	0
3 <u>BEAGLE</u>	06/14/1975	1350	Hail	1.75 in.	0	0	0	0
4 <u>BEAGLE</u>	05/28/1976	1643	Hail	0.75 in.	0	0	0	0
5 <u>BEAGLE</u>	07/30/1977	1930	Hail	0.75 in.	0	0	0	0
6 <u>BEAGLE</u>	06/17/1978	1530	Hail	1.75 in.	0	0	0	0
7 <u>BEAGLE</u>	09/09/1984	1715	Hail	1.75 in.	0	0	0	0
8 <u>BEAGLE</u>	06/16/1985	0800	Hail	0.75 in.	0	0	0	0
9 <u>BEAGLE</u>	06/23/1985	1639	Hail	1.75 in.	0	0	0	0
10 <u>BEAGLE</u>	08/17/1987	1839	Hail	1.50 in.	0	0	0	0
11 <u>BEAGLE</u>	05/08/1988	1123	Hail	2.00 in.	0	0	0	0
12 <u>BEAGLE</u>	04/26/1989	1555	Hail	1.50 in.	0	0	0	0
13 <u>BEAGLE</u>	04/26/1989	1637	Hail	1.75 in.	0	0	0	0
14 <u>BEAGLE</u>	05/24/1989	0345	Hail	0.75 in.	0	0	0	0
15 <u>BEAGLE</u>	07/18/1989	0046	Hail	1.75 in.	0	0	0	0
16 <u>BEAGLE</u>	04/12/1991	1010	Hail	1.75 in.	0	0	0	0
17 <u>BEAGLE</u>	06/01/1991	1035	Hail	1.75 in.	0	0	0	0
18 <u>Prairie City</u>	04/08/1995	2127	Hail	1.50 in.	0	0	40K	0
19 <u>Newton</u>	06/05/1997	03:00 PM	Hail	1.00 in.	0	0	5K	35K
20 <u>Colfax</u>	04/13/1998	04:24 AM	Hail	0.75 in.	0	0	1K	0
21 <u>Colfax</u>	05/19/1998	03:24 PM	Hail	1.00 in.	0	0	10K	10K
22 <u>Prairie City</u>	05/18/2000	11:20 AM	Hail	1.75 in.	0	0	5K	5K
23 <u>Prairie City</u>	05/18/2000	11:23 AM	Hail	3.00 in.	0	0	20K	10K
24 <u>Prairie City</u>	05/18/2000	11:25 AM	Hail	1.75 in.	0	0	20K	2K
25 <u>Newton</u>	05/18/2000	11:28 AM	Hail	2.75 in.	0	0	50K	5K
26 <u>Monroe</u>	05/18/2000	11:40 AM	Hail	2.75 in.	0	0	10K	5K
27 <u>Kellogg</u>	05/18/2000	11:43 AM	Hail	1.75 in.	0	0	5K	5K
28 <u>Newton</u>	05/18/2000	11:43 AM	Hail	1.75 in.	0	0	10K	5K

29 <u>Reasnor</u>	05/18/2000	11:43 AM	Hail	2.75 in.	0	0	35K	5K
30 <u>Newton</u>	05/30/2000	08:48 PM	Hail	0.88 in.	0	0	2K	3K
31 <u>Newton</u>	05/30/2000	08:50 PM	Hail	1.50 in.	0	0	8K	5K
32 <u>Newton</u>	05/30/2000	09:44 PM	Hail	0.88 in.	0	0	3K	5K
33 <u>Kellogg</u>	05/30/2000	10:00 PM	Hail	1.00 in.	0	0	5K	5K
34 <u>Galesburg</u>	05/30/2000	11:10 PM	Hail	0.88 in.	0	0	2K	5K
35 <u>Baxter</u>	07/26/2000	09:30 AM	Hail	0.75 in.	0	0	0	5K
36 <u>Baxter</u>	07/26/2000	09:35 AM	Hail	1.00 in.	0	0	5K	5K
37 <u>Kellogg</u>	07/26/2000	09:35 AM	Hail	1.00 in.	0	0	3K	10K
38 <u>Newton</u>	07/26/2000	09:42 AM	Hail	0.75 in.	0	0	0	10K
39 <u>Monroe</u>	04/08/2001	06:37 PM	Hail	1.00 in.	0	0	5K	0
40 <u>Reasnor</u>	04/08/2001	06:41 PM	Hail	0.88 in.	0	0	2K	0
41 <u>Newton</u>	05/10/2001	05:52 PM	Hail	1.00 in.	0	0	5K	0
42 <u>Newton</u>	05/10/2001	06:00 PM	Hail	1.00 in.	0	0	5K	0
43 <u>Reasnor</u>	05/10/2001	06:17 PM	Hail	1.00 in.	0	0	5K	0
44 <u>Darwin</u>	05/10/2001	06:29 PM	Hail	1.00 in.	0	0	5K	0
45 <u>Prairie City</u>	05/10/2001	06:36 PM	Hail	0.88 in.	0	0	3K	0
46 <u>Darwin</u>	05/10/2001	06:48 PM	Hail	0.75 in.	0	0	0	0
47 <u>Darwin</u>	05/10/2001	06:50 PM	Hail	1.25 in.	0	0	10K	0
48 <u>Baxter</u>	06/12/2001	01:00 PM	Hail	1.00 in.	0	0	5K	5K
49 <u>Newton</u>	06/12/2001	06:05 AM	Hail	0.88 in.	0	0	2K	5K
50 <u>Baxter</u>	06/12/2001	08:59 AM	Hail	1.00 in.	0	0	2K	5K
51 <u>Galesburg</u>	06/12/2001	09:20 AM	Hail	1.25 in.	0	0	5K	5K
52 <u>Darwin</u>	06/12/2001	09:40 AM	Hail	1.75 in.	0	0	25K	5K
53 <u>Lynnville</u>	06/12/2001	09:55 AM	Hail	1.75 in.	0	0	25K	10K
54 <u>Reasnor</u>	04/18/2002	06:42 PM	Hail	0.88 in.	0	0	3K	0
55 <u>Newton</u>	04/18/2002	07:06 PM	Hail	0.88 in.	0	0	3K	0
56 <u>Colfax</u>	05/29/2002	03:46 PM	Hail	1.00 in.	0	0	5K	5K
57 <u>Colfax</u>	06/26/2002	04:13 PM	Hail	1.00 in.	0	0	5K	5K
58 <u>Colfax</u>	06/26/2002	04:31 PM	Hail	1.00 in.	0	0	5K	5K
59 <u>Colfax</u>	06/26/2002	04:57 PM	Hail	0.75 in.	0	0	0	5K
60 <u>Colfax</u>	07/28/2002	07:54 PM	Hail	0.88 in.	0	0	2K	5K
TOTALS:					0	0	366K	200K

APPENDIX E

WINTER STORMS

TABLE OF CONTENTS

Winter Storm Overview	2
Snow and Ice Events in Beagle County	3



## Winter Storms

Winter storms consisting of extreme cold and heavy concentrations of snowfall or ice can last for several days. The occurrence of large snowstorms, ice storms, and severe blizzards has a substantial impact on utilities and transportation systems, and can result in loss of life due to accidents or hypothermia. People can become stranded at home, often without utilities or other services.

A winter storm can range from moderate snowfall over a few hours to blizzard conditions. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow. The leading cause of death is automobile accidents. Deaths also occur as a result of hypothermia and heart attacks due to over exertion.

Businesses may experience severe financial loss because of reduced productivity during unscheduled downtime and customers' inability to reach the facility. Accumulation of ice can cause damage to power lines and disruption of service and ice can pose hazards to motorists and pedestrians. Extremely cold weather may cause water mains to freeze. Agricultural interests are also impacted. Not only are crops vulnerable to extreme temperatures, but also livestock losses can occur.

### Mitigation

1. Weatherize homes. Properly insulating homes conserves electricity and reduce power demands. Caulking and weather stripping doors and windowsills keep out cold air. These actions allow the inside temperatures to stay warmer.
2. Protect pipes to avoid freezing.
3. Install snow fences to reduce drifting in roads and paths.
4. Educate the public about winter storm hazards. This is particularly important if the community has a population that emigrated from more moderate climates and has little experience with winter weather.
5. Promote NOAA weather radios and educate the public about the different National Weather Service announcement.
6. Establish tree-trimming programs that remove branches near power lines.
7. Identify vulnerable populations who may require special assistance.
8. Enact building codes with snow load requirements.
9. Require buried power lines in new subdivisions.



APPENDIX F

DROUGHT

TABLE OF CONTENTS

Drought Overview	2
Palmer Drought Severity Index, 1985- 1995	3
Drought Events in Iowa and Beagle County	4

## Drought

Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. Other climatic factors such as high temperatures, prolonged high winds, and low relative humidity can aggravate the severity of a drought. Severity depends on duration, intensity, geographic extent and the demands made by human activities and vegetation of regional water supplies.

During droughts crops do not mature, wildlife and livestock are undernourished, land values decrease and unemployment increases. Traditionally, States have relied in the Federal Government to provide drought relief when shortages reach disaster or near-disaster proportions. Forty separate drought relief programs administered by 16 Federal agencies provided nearly \$8 billion in relief during the mid-1970 droughts and Federal assistance totaled more than \$5 billion in response to the 1987-89 drought. However, Federal assistance covers only a small portion of the economic losses. The average yearly loss to drought in the US is between \$6 and \$8 million and the total losses attributed to the 1987-89 drought were between \$39 and \$40 billion.

## Mitigation

The widespread nature of droughts makes local level drought mitigation a difficult task. This, coupled with an increasing awareness of the inefficient past responses and impacts of droughts, has generated momentum in many areas at the State and/or regional level. Mitigation actions adopted by States fall into the following areas:

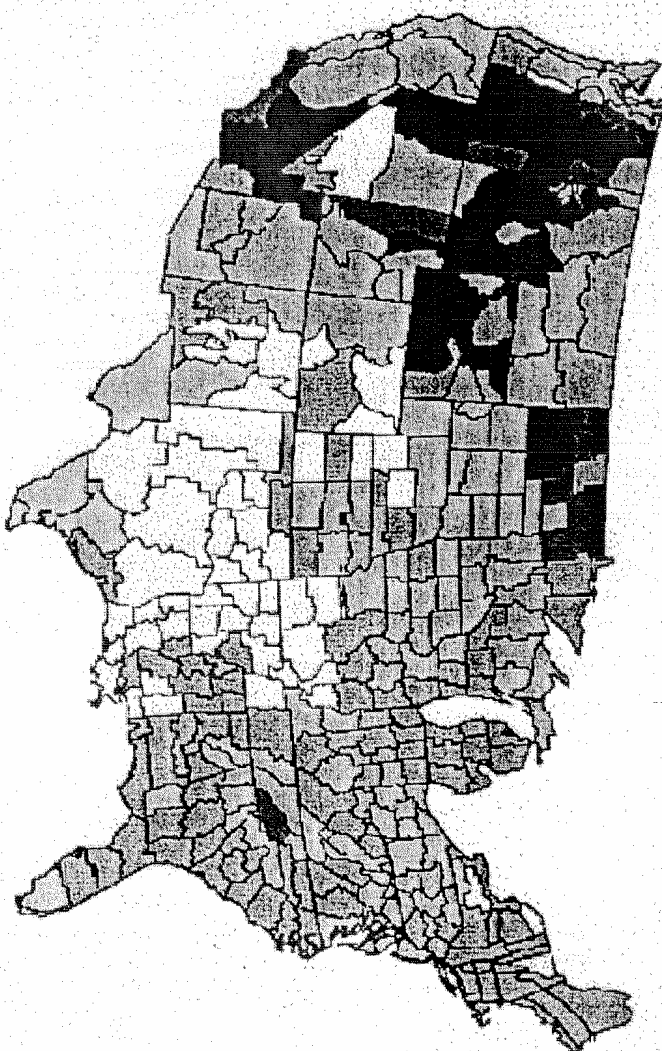
1. Assessment programs
2. Legislation and public policy
3. Water supply augmentation and development of new supplies
4. Public awareness and education programs
5. Technical assistance on water conservation
6. Demand reduction and after conservation programs
7. Emergency response programs
8. Water use conflict resolution
9. Drought contingency plans

# PALMER DROUGHT MAP

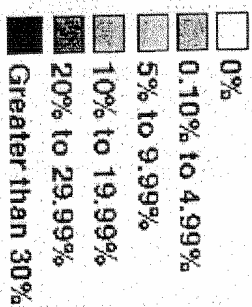
## Palmer Drought Severity Index

1985-1995

Percent of time in severe and extreme drought



% of time PDSI  $\leq -3$



SOURCE: McKee et al. (1993); NOAA (1990); High Plains Regional Climate Center (1996)  
Albers Equal Area Projection; Map prepared at the National Drought Mitigation Center

**NDMC**

**10 DROUGHT** event(s) were reported in **Iowa** between **01/01/1950** and **10/31/2002**.

**Mag:** Magnitude  
**Dth:** Deaths  
**Inj:** Injuries  
**PrD:** Property Damage  
**CrD:** Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 All of Iowa	08/01/1995	0000	Drought	N/A	0	0	0	0.5B
2 IAZ057>062 - 070>075 - 081>086 - 092>097	07/20/1999	12:00 PM	Drought	N/A	0	0	0	109.9M
3 IAZ001>003 - 012>014 - 020>022 - 031>032	11/01/1999	12:00 AM	Drought	N/A	0	0	0	0
4 IAZ001>003 - 012>014 - 020>022 - 031>032	12/01/1999	12:00 AM	Drought	N/A	0	0	0	0
5 IAZ001>003 - 012>014 - 020>022 - 031>032	02/01/2000	12:00 AM	Drought	N/A	0	0	0	0
6 IAZ001>003 - 012>014 - 020>022 - 031>032	03/01/2000	12:00 AM	Drought	N/A	0	0	0	0
7 IAZ001>003 - 012>014 - 020>022 - 031>032	04/01/2000	12:00 AM	Drought	N/A	0	0	0	0
8 IAZ033 - 044>050 - 057>062 - 070>075 - 081>086 - 092>097	08/14/2000	12:00 AM	Drought	N/A	0	0	0	150.1M
9 IAZ033 - 044>050 - 057>062 - 070>075 - 081>086 - 092>097	09/01/2000	12:00 AM	Drought	N/A	0	0	0	161.0M
10 IAZ004>007 - 015>017 - 023>028 - 033>039 - 044>050 - 057>062 - 070>075 - 081>086 - 092>097	08/01/2001	12:00 AM	Drought	N/A	0	0	0	578.9M
TOTALS:					0	0	0	1.500B

**5 DROUGHT** event(s) were reported in **Beagle County, Iowa** between **01/01/1995** and **10/31/2002**.

**Mag:** Magnitude  
**Dth:** Deaths  
**Inj:** Injuries  
**PrD:** Property Damage  
**CrD:** Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 All of Iowa	08/01/1995	0000	Drought	N/A	0	0	0	0.5B
2 IAZ057>062 - 070>075 - 081>086 - 092>097	07/20/1999	12:00 PM	Drought	N/A	0	0	0	109.9M
3 IAZ033 - 044>050 - 057>062 - 070>075 - 081>086 - 092>097	08/14/2000	12:00 AM	Drought	N/A	0	0	0	150.1M
4 IAZ033 - 044>050 - 057>062 - 070>075 - 081>086 - 092>097	09/01/2000	12:00 AM	Drought	N/A	0	0	0	161.0M
5 IAZ004>007 - 015>017 - 023>028 - 033>039 - 044>050 - 057>062 - 070>075 - 081>086 - 092>097	08/01/2001	12:00 AM	Drought	N/A	0	0	0	578.9M
TOTALS:					0	0	0	1.500B

APPENDIX G

EARTHQUAKE

TABLE OF CONTENTS

Backgrounder: Earthquake	2
Iowa Earthquake History	3
Earthquakes with Epicenters in Iowa	4
The Modified Mercalli Intensity Scale	5
Potential for Future Iowa Earthquakes and Earthquake Damage	6

## **WHAT IS AN EARTHQUAKE?**

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of the year.

## **EMERGENCY INFORMATION**

1. The best protection during an earthquake is to get under heavy furniture such as a desk, table, or bench
2. The greatest danger exists directly outside buildings, at exits, and alongside exterior walls. Many of the 120 fatalities from the 1933 Long Beach earthquake occurred when people ran outside of buildings only to be killed by falling debris from collapsing walls.
3. Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

## **DANGER ZONES**

Earthquakes occur most frequently west of the Rocky Mountains, although historically the most violent earthquakes have occurred in the central United States. All 50 states and all U.S. territories are vulnerable to earthquakes. Forty-one states or territories are at moderate to high risk.

## **DID YOU KNOW...**

- The granddaddy of earthquakes was along the New Madrid Fault in Missouri where a 3-month long series of quakes in 1811--1812 included the three quakes larger than a magnitude of 8. These quakes were felt over 2 million square miles. Charles F. Richter developed the Richter Scale in 1935. It is a logarithmic measurement of the amount of energy released by an earthquake. Earthquakes with a magnitude of at least 4.5 are strong enough to be recorded by sensitive seismographs all over the world. In the United States several thousand shocks of varying sizes occur annually.
- The Modified Mercalli Intensity scale also measures the effects of earthquakes. The intensity of a quake is evaluated according to the observed severity of the quake at specific locations. The Mercalli scale rates the intensity on a Roman numeral scale that ranges from I to XI.
- The Loma Prieta (northern California) earthquake of October 1989 registered 7.1 on the Richter scale and as high as XI on the Mercalli scale.



## Earthquake History of Iowa

Iowa has experienced only minor earthquake activity since the United States obtained control of the State under the Louisiana Purchase in 1803. It was not until 1857, 11 years after Statehood, that the present boundaries were drawn up. As a territory, Iowa had included Minnesota and parts of North and South Dakota.

The great New Madrid Missouri, earthquakes, of 1811 - 1812 were the first reported felt in Iowa. The absence of historical records from the territory prevents an accurate assessment of the actual effects from these earthquakes.

An earthquake shook the Sioux City area on July 3, 1858. Press reports described the tremors as of sufficient force to shake pictures and crockery from their places. On October 9, 1872, Sioux City again experienced a moderately strong earthquake. Intensity V effects were noted near the center of the disturbance, with the total felt areas estimated to be about 3,000 square miles, including adjoining portions of the Dakotas.

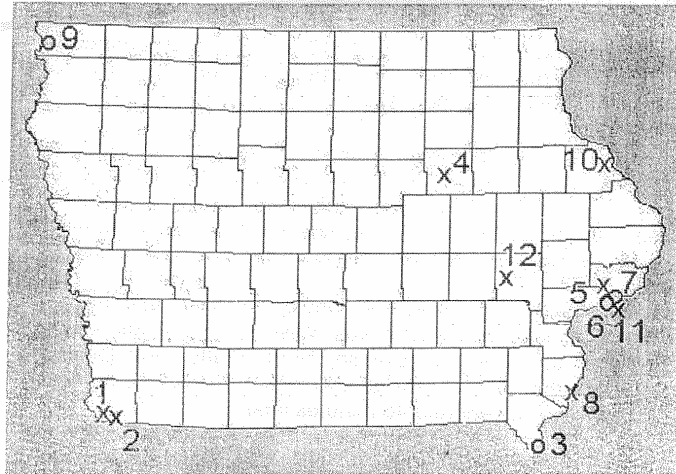
On November 15, 1877, another earthquake was felt throughout Iowa and eastern Nebraska, and in parts of Missouri, Kansas, the Dakotas, Wisconsin, and Minnesota. The strongest effects were noted at Columbus, Lincoln, North Platte, and Omaha, Nebraska. However, large cracks in the walls of several buildings in Sioux City resulted from this shock. A second earthquake was reported 45 minutes later.

An intensity V shock was reported at Keokuk on April 13, 1905. Buildings were shaken, but no serious damage was done. The shock was apparently local in character. Riverton, Iowa, felt intensity V effects from an earthquake on March 1, 1935, which was centered in southeastern Nebraska.

Two other events are significant. On October 20, 1965, an earthquake in eastern Missouri affected a 160,000 square mile area, and reportedly caused large cracks in a house foundation at Indianola, Iowa. Intensity V effects were also noted at Ottumwa. The earthquake of November 9, 1968, centered in Illinois, produced Intensity V effects in Iowa at Albia, Bloomfield, Burlington, Clinton, Elkader, Muscatine, and Wapello. The earthquake was not felt in the northwestern quadrant of the State. The 1895 tremor, centered near Charleston, Missouri, did some slight damage to a few chimneys in Keokuk. This earthquake was felt noticeably in the southeastern part of Iowa, and probably felt over the whole State.

## Earthquakes with Epicenters in Iowa

Only 12 earthquakes with epicenters in Iowa are known in historic times. The first known occurrence was in 1867 near Sidney in southwest Iowa; the most recent occurrence was in 1948 near Oxford in east-central Iowa. The largest Iowa earthquake (Mercalli magnitude VI) occurred near Davenport in southeast Iowa in 1934. None of these events were instrumentally recorded



Number Date Nearest Town Mercalli Magnitude

1. Apr. 28, 1867, Sidney (IA) / Nebraska City (NE), IV
2. Dec. 09, 1875, Sidney (IA) / Nebraska City (NE), III
3. April 13, 1905, Keokuk (IA) / Wayland (MO) IV-V
4. Jan. 26, 1925, Waterloo (IA) II
5. Nov. 12, 1934, Davenport (IA) / Rock Island (IL)\*VI
6. Jan. 05, 1935, Davenport (IA) / Rock Island (IL) IV
7. Jan. 05, 1935, Davenport (IA) / Rock Island (IL) III
8. Feb. 26, 1935, Burlington (IA) III
9. Oct. 11, 1938, Inwood (IA) V
10. Nov. 08, 1938, Dubuque (IA) \*\*-II
11. Nov. 24, 1939, Davenport (IA) / Rock Island (IL) II-III
12. Apr. 20, 1948, Oxford (IA) IV

## The Modified Mercalli Intensity Scale

The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture; damage to chimneys, and finally - total destruction. Although numerous *intensity scales* have been developed over the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli (MM) Intensity Scale. It was developed in 1931 by the American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead it is an arbitrary ranking based on observed effects.

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced at that place. After the occurrence of widely felt earthquakes, the Geological Survey mails questionnaires to postmasters in the disturbed area requesting the information so that intensity values can be assigned. The results of this postal canvass and information furnished by other sources are used to assign intensity within the felt area. The maximum observed intensity generally occurs near the epicenter.

The *lower* numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The *higher* numbers of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above.

The following is an abbreviated description of the 12 levels of Modified Mercalli intensity.

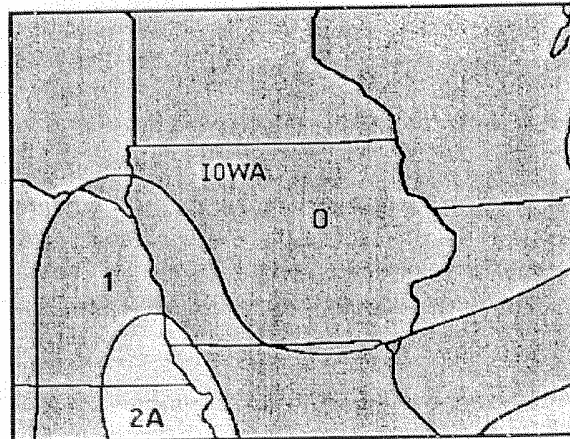
- I. Not felt except by a very few under especially favorable conditions.
- II. Felt only by a few persons at rest, especially on upper floors of buildings.
- III. Felt, quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
- IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
- V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
- VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
- VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
- VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
- IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
- XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
- XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

## POTENTIAL FOR FUTURE IOWA EARTHQUAKES AND EARTHQUAKE DAMAGE

Most of Iowa falls within Uniform Building Code (UBC) seismic zone 0, with the southern tip of Lee County, in southeast Iowa, and portions of western Iowa falling within seismic zone 1. Most of Fremont County, in southwest Iowa, lies in seismic zone 2A.

**Seismic Impact Zones** are regions with a 90% or greater probability that the acceleration (due to a seismic event) will exceed 0.10 g (or 10% of the Earth's gravitational pull) in 250 years. Algermissen delineated these areas and others (1982, U.S. Geological Survey Open File Report 82-1033) based on probabilistic estimates of the maximum acceleration and velocity in rock. The zones are delineated on Plate 3 of this report. Federal regulations for hazardous waste landfills state that new units and lateral expansions shall not be located in seismic impact zones, unless it can be demonstrated that the facility is designed to resist the event.

**Uniform Building Code Seismic Hazard Map**



**APPENDIX H**

**HAZARDOUS MATERIALS**

**TABLE OF CONTENTS**

Hazardous Materials Overview	2
Beagle County Pipelines	6
Iowa Hazardous Materials Teams	7
EPA-Regulated Facilities	8

## Hazardous Materials Overview

Under the Emergency Planning and Right to Know Act of 1986, the US Department of Transportation (DOT) identified as hazardous 308 specific chemicals from 20 chemical categories.

USEPA sorts HAZMAT into the following categories:

- Toxic agents (irritants, asphyxiants, anesthetics and narcotics, sensitizers)
- Other types of toxic agents (hepatotoxic and nephrotoxic agents, carcinogens, mutagens)
- Hazardous wastes
- Hazardous substances
- Toxic pollutants
- Extremely hazardous substances

DOT classifies HAZMAT in the following categories:

- Explosive
- Blasting agent
- Flammable liquid
- Flammable solid
- Oxidizer
- Organic peroxide
- Corrosive material
- Compressed gas
- Flammable compressed gas
- Poison (A and B)
- Irritating materials
- Inhalation hazard
- Etiological agent
- Radioactive materials
- Other regulated material

To identify the extent of the hazard in a particular community, planning personnel and others must determine:

- What types of HAZMAT are stored, handled, processed, or transported
- Where and how those functions are performed

Storage, handling, and processing will usually take place at fixed sites:

- Bulk chemical, petroleum processing, and other industrial facilities
- Hazardous waste disposal and water treatment facilities
- Public and private chemistry laboratories
- US Army weapons depots

The 1986 Act requires that companies report releases of designated hazardous chemicals to USEPA, even if releases do not result in human exposure. Types of releases are:

- Air emissions of gases or particles from a pressure relief valve, smokestack, ruptured reaction vessel, broken pipe or other equipment at a chemical plant or other fixed-site facility; from broken, loose-fitting, or punctured equipment, containers, or cylinders on transportation vehicles; and from solid or liquid discharges onto ground or into water
- Discharges into bodies of water from damaged ships, barges, underwater pipelines, and trucks or railroad cars that fall into the water;
- Discharges as outflows from sewer or drain outfalls, runoff from spills on land, runoff from water used to control fires, or contaminated groundwater
- Discharges onto land
- Solid waste disposal in onsite landfills
- Injection of wastes into underground wells
- Transfers of wastewater to public sewage plants
- Transfers of wastes to offsite facilities for treatment or storage.

#### Fixed-Site Facilities:

- Large refineries, chemical plants, and storage terminals
- Moderate-sized industrial users, warehouses, and isolated storage tanks for water treatment
- Small quantity users and storage facilities, such as school laboratories, florists/greenhouses, and hardware/automotive stores

#### Highway and Rail Transportation

- Transportation on highways involves tanker trucks or trailers and specialized bulk-cargo vehicles
- Average trip lengths are 28 miles for gasoline trucks and 260 miles for chemical trucks
- Most common releases from railroad events are:
  - o Collisions and derailments that result in large spills or discharges
  - o Releases from leaks in fittings, seals, or relief valves, and improper closures or defective equipment.
    - Account for 70% of the nearly 1,000 railroad-related events each year

#### Air Transportation

- Limited to small packages
- 1986 figures: 200,000 to 300,000 tons
- Few events occur each year; usually due to violations of regulations

## Transportation Incidents

Mode of Transportation	Number of Accidents	Associated Deaths	Associated Injuries
Air	1,220	0	153
Highway	41,781	79	1,569
Railway	7,886	1	423
Water	83	1	35
Other	29	0	2
Total	50,999	81	2,182

*Hazardous Materials Incidents by Transportation Mode (totals, 1983 thru 1990\*)*

## Natural Hazards

Natural hazards can cause HAZMAT releases at **fixed** sites. When a HAZMAT event occurs during a natural disaster, access to facilities may be restricted, waterlines for fire suppression may be broken, and response personnel and resources may be limited.

Natural hazards may cause **transportation related** HAZMAT events, including:

- Heavy rainfall during thunderstorms can cause slippery road conditions resulting in highway carrier accidents
- Flood, lightning, fires, and severe winter storms cause pipelines to fail
- Snow, ice, and high-wind conditions during severe winter storms cause traffic accidents
- High velocities and volumes of floodwaters wash out bridges, roads, and fixed HAZMAT manufacturing, handling, and storage facilities

HAZMAT releases pose short- and long-term toxological threats to humans and to terrestrial and aquatic plants and wildlife. Toxic materials affect people through one of three processes:

- Inhalation exposures result from breathing gases that may have been vented from containers, liquid aerosols generated during venting of pressurized liquids, fumes from spilled acids, vapors created by evaporating liquids, and airborne dust.
- Ingestion exposures typically result from poor hygiene habits after handling contaminated materials or eating contaminated food, or the inhalation of insoluble particles that become trapped in mucous membranes
- Skin may be affected by direct contact with gas, liquid, or solid forms of hazardous materials



## Local Emergency Planning Committees

Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 requires that each community establish a Local Emergency Planning Committee (LEPC) to be responsible for developing an emergency plan for preparing for and responding to chemical emergencies in that community.

This emergency plan must include the following

- an identification of local facilities and transportation routes where hazardous material are present
- the procedures for immediate response in case of an accident (this must include a community-wide evacuation plan)
- a plan for notifying the community that an incident has occurred
- the names of response coordinators at local facilities
- a plan for conducting exercises to test the plan.

The plan is reviewed by the State Emergency Response Commission (SERC) and publicized throughout the community. The LEPC is required to review, test, and update the plan each year.

## Mitigation Approaches

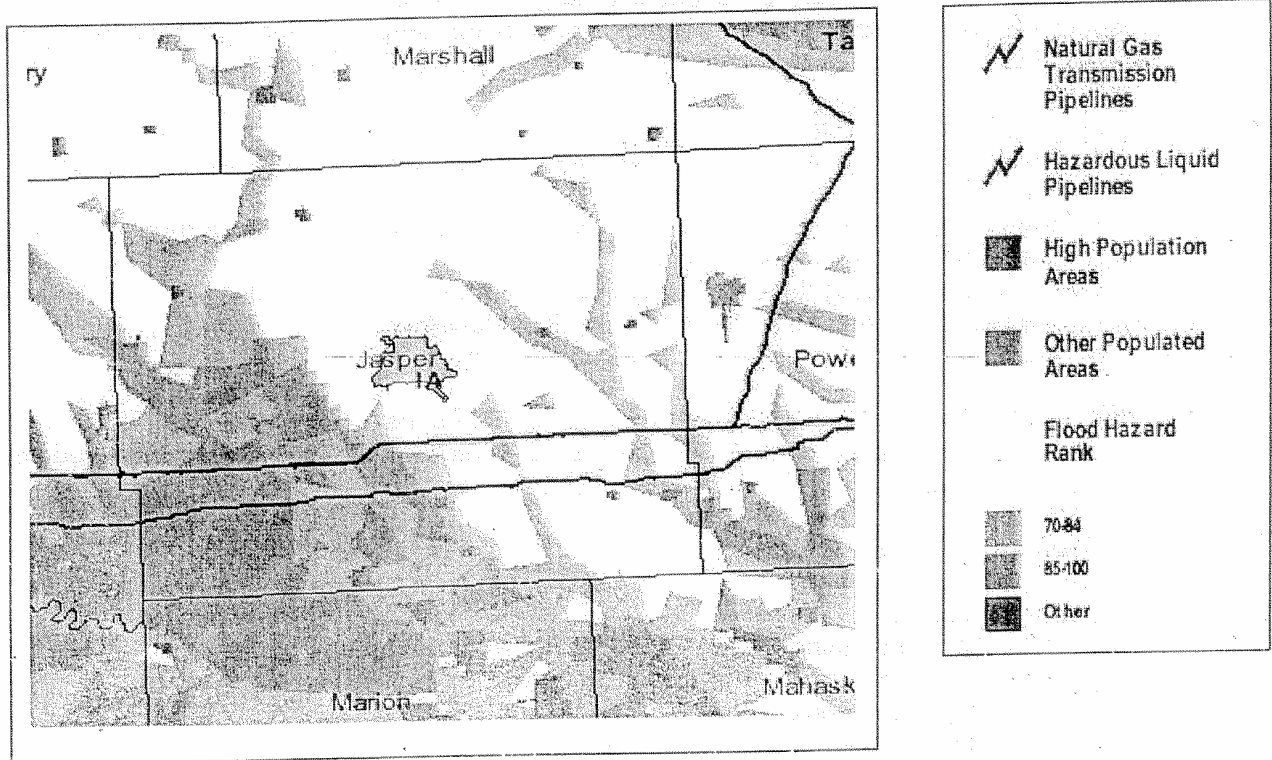
### Physical Adjustments

- Planning and building HAZMAT facilities to withstand prevalent natural hazards identifying and avoiding sites where hazards are highly likely to occur
- Predicting the occurrence of hazards
- Preventing or altering the characteristics of hazards

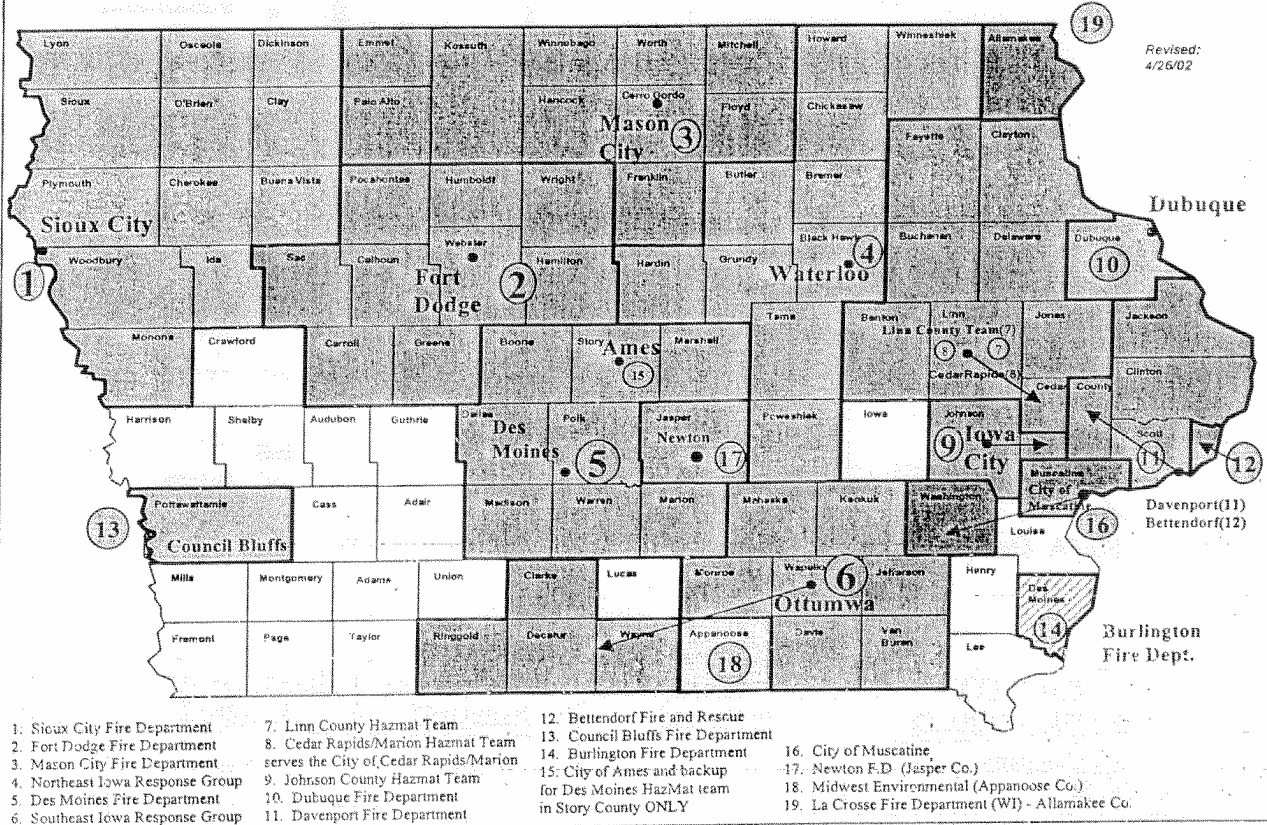
### Social Adjustments

- Restricting the use of land and establishing minimum standards for avoiding hazardous sites and conditions
- Implementing Local Emergency Planning Committees to enhance public awareness of hazardous materials in communities
- Instituting public awareness campaigns in areas prone to hazards in the vicinity of HAZMAT sites
- Initiating emergency preparedness and evacuation programs to protect life and property when warnings are issued or events occur
- Establishing systems for notifying key individuals in the public and private sectors, including supervisory personnel of facilities requiring special notification, water users, supervisory personnel of water treatment plants, utility companies, air traffic controllers, railroad dispatchers, and US Coast Guard or harbor master facilities
- Spreading the economic loss among a larger population through insurance, taxation, and monetary grants
- Reconstructing communities to be less vulnerable to future hazard events and HAZMAT releases

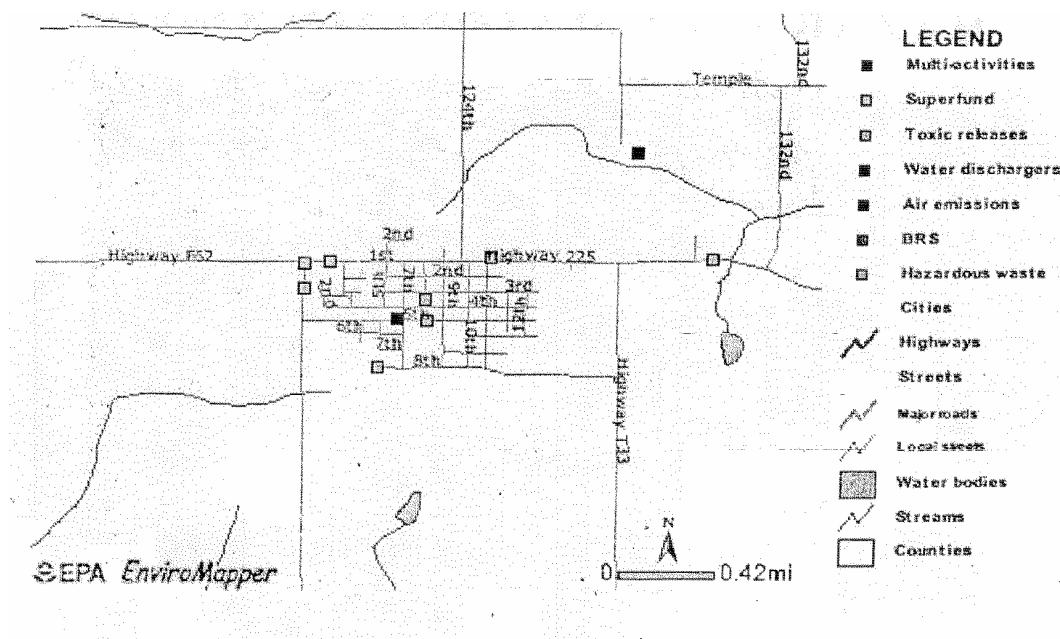
## BEAGLE COUNTY PIPELINE



# HAZARDOUS MATERIALS TEAMS



# LIST OF EPA-REGULATED FACILITIES DARWIN, IA



FACILITY NAME/ADDRESS	Permitted Discharges To Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Air Releases Reported?
<u>Bz Auto Company</u> 702 5th St	No	No	Yes	No
<u>Lynnville Transport</u> 13051 Hwy 225 E	No	No	Yes	No
<u>Lynnville-Darwin High School</u> 12476 Hwy 225 E	No	No	Yes	No
<u>Darwin Auto Body</u> 102 1st Street	No	No	Yes	No
<u>Darwin City of Stp</u> City Clerk	Yes	No	No	No
<u>Darwin Construction</u> 5th Ave & 8th St	No	No	Yes	No
<u>Darwin Cooperative</u> <u>Exchange</u> 504 6th Avenue	No	No	Yes	Yes
<u>Darwin Mfg Co</u> 307 7th Ave	No	No	Yes	No
<u>Darwin Oil Co Inc</u> 206 1st St	No	No	Yes	No
<u>Zylstra Express Ltd</u> 205 1st Ave	No	No	Yes	No

Jurisdiction: City of Darwin, Iowa

**RISK ASSESSMENT:** §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

## Identifying Hazards

**Requirement §201.6(c)(2)(i):** *[The risk assessment shall include a] description of the type ... of all natural hazards that can affect the jurisdiction.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan include a <b>description</b> of the types of <b>all natural hazards</b> that affect the jurisdiction? If the hazard identification omits (without explanation) any hazards commonly recognized as threats to the jurisdiction, this part of the plan cannot receive a Satisfactory score. Consult with the State Hazard Mitigation Officer to identify applicable hazards that may occur in the planning area.	Hazard Analysis P. 1 – 17, Appendix B – H	The plan addresses hazards expected in this region.  <b>Recommended Revisions:</b>  <ul style="list-style-type: none"> <li>Identify all hazards considered – including ones not studied because they are not applicable to allow the reviewers to understand the universe of hazards that were considered.</li> <li>Describe the process for identifying hazards and list the sources used to identify hazards. The process for identifying hazards could involve: reviewing reports, plans, flood ordinances, and land use regulations, among others; talking to experts from Federal, State, and local agencies and universities; searching the Internet and newspapers; and interviewing long-time residents.</li> <li>Provide an explanation for eliminating any hazards from consideration.</li> <li>Addressing manmade hazards in the plan is not necessary to meet the DMA 2000 requirements, but highly encouraged. For more information, see <i>Integrating Manmade Hazards into Mitigation Planning</i> (FEMA 386-7), Phase 2.</li> </ul> For more information on identifying hazards, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 1, Worksheet #1, Identify the Hazards.		✓
SUMMARY SCORE				✓

## Profiling Hazards

**Requirement §201.6(c)(2)(i):** [The risk assessment **shall** include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the risk assessment identify the <b>location</b> (i.e., geographic area affected) of each natural hazard addressed in the plan?	Hazard Analysis P. 3 - 17	<p>With the exception of flash floods, all hazards are City-wide. No specific geographic area is identified for flash floods, although flash floods affect up to 5% of the jurisdiction.</p> <p><b>Required Revisions:</b></p> <ul style="list-style-type: none"> <li>For flash floods, describe the hazard's location or geographical area that would be affected.</li> </ul> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>Note any data limitations for profiling hazards and include in the mitigation strategy actions for collecting the data to complete and improve future risk analysis efforts.</li> </ul> <p>For more information on profiling hazards, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 2.</p>	✓	
B. Does the risk assessment identify the <b>extent</b> (i.e., magnitude or severity) of each hazard addressed in the plan?	Hazard Analysis P. 3 – 17, Appendix B – H	<p>Each hazard includes a statement regarding "severity of impact" and "maximum extent."</p> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>For flash floods, include velocity characteristics.</li> <li>Include in the hazard profile conditions such as topography, soil characteristics, and meteorological conditions that may exacerbate or mitigate the potential effects of a particular hazard. See <i>Understanding Your Risks</i> (FEMA 386-2), page 2-13 for information on these conditions and their effect on hazards like floods.</li> </ul> <p>For more information on profiling hazards, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 2.</p>		✓
C. Does the plan provide information on <b>previous occurrences</b> of each hazard addressed in the plan?	Hazard Analysis P. 3 - 17	<p>Each profile includes discussion of "historical occurrence" and the appendix data includes additional historic records</p>		✓

Jurisdiction: City of Darwin, Iowa

		<b>Recommended Revisions:</b> <ul style="list-style-type: none"> <li>• Include in the description for each event the date of occurrence, damages that occurred in or near the planning area (e.g., property damage, cost of recovery, lives lost); level of severity (i.e., flood depth or extent, wind speeds, earthquake intensity, etc.); and duration of the event.</li> </ul> <p>For more information on profiling hazards, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 2.</p>		
D. Does the plan include the <b>probability of future events</b> (i.e., chance of occurrence) for each hazard addressed in the plan?	Hazard Analysis P. 3 - 17	<p>Profiles of each hazard include a description of "probability."</p> <b>Recommended Revisions:</b> <ul style="list-style-type: none"> <li>• Describe the methodology or sources used to determine the probability for each natural hazard.</li> </ul> <p>For more information on profiling hazards, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 2.</p>		✓
SUMMARY SCORE			✓	

## Assessing Vulnerability: Overview

**Requirement §201.6(c)(2)(ii):** [The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan include an <b>overall summary</b> description of the jurisdiction's <b>vulnerability</b> to each hazard?	Hazard Analysis P. 3 - 17	<p>Each hazard profile includes a description of "vulnerability."</p> <b>Recommended Revisions:</b> <ul style="list-style-type: none"> <li>• While the Rule does not require a discussion about the number of people or special populations at risk, such as the elderly, disabled, or others with special needs, their consideration in the risk assessment will enable the development of appropriate actions to assist such populations during or after a disaster.</li> </ul> <p>For a discussion on vulnerability assessment overview, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 3, Worksheet #3a, Inventory Assets.</p>		✓
B. Does the plan address the <b>impact</b> of each hazard on the jurisdiction?	Hazard Analysis P. 3 - 17	Each hazard profile includes a description of "Maximum		✓

		Threat," "Severity of Impact," and "Speed of Onset."  For a discussion on preparing a vulnerability assessment, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 3, Worksheet #3a, Inventory Assets.		
SUMMARY SCORE				✓

### Assessing Vulnerability: Identifying Structures

**Requirement §201.6(c)(2)(ii)(A):** *The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area ... .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan describe vulnerability in terms of the <b>types and numbers</b> of <b>existing</b> buildings, infrastructure, and critical facilities located in the identified hazard areas?	Hazard Analysis P. 3 - 17	<p><b>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</b></p> <p>The profiles do not indicate the number or types of buildings, infrastructure, or critical facilities for each hazard.</p> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>For flash floods, and community-wide hazards, identify the type and number of <b>existing</b> buildings, infrastructure, and critical facilities within each hazard area.</li> </ul> <p><b>Additional Suggestions:</b></p> <ul style="list-style-type: none"> <li>Identify the kinds of buildings (e.g., residential, commercial, institutional, recreational, industrial, and municipal); infrastructure, (e.g., roadways, bridges, utilities, and communications systems); and critical facilities (e.g., shelters, hospitals, police, and fire stations).</li> <li>Describe the process or method used for identifying existing buildings, infrastructure, and critical facilities.</li> <li>If limited data are available, focus on identifying critical facilities located in the identified hazard areas and identify the collection of data for the remaining buildings and infrastructure as an action item in the mitigation strategy.</li> <li>While not required by the Rule, it is useful to inventory structures located within areas that have repeatedly flooded</li> </ul>	✓	



		<p>and collect information on past insurance claims. At a minimum, describe repetitive loss neighborhoods or areas in the plan.</p> <p>For a discussion on identifying vulnerable structures and detailed inventories, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 3, Worksheet #3a and #3b, Inventory Assets.</p>		
<p>B. Does the plan describe vulnerability in terms of the <b>types and numbers</b> of <b>future</b> buildings, infrastructure, and critical facilities located in the identified hazard areas?</p>	<p>Hazard Analysis P. 3 - 17</p>	<p><b>Note: A “Needs Improvement” score on this requirement will not preclude the plan from passing.</b></p> <p>Future development is not described in terms of types and numbers of buildings, infrastructure, or critical facilities.</p> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>Identify the type and number of <b>future</b> buildings, infrastructure, and critical facilities within each hazard area.</li> </ul> <p><b>Additional Suggestions:</b></p> <ul style="list-style-type: none"> <li>Identify the types of buildings (e.g., residential, commercial, institutional, recreational, industrial, and municipal buildings); infrastructure, (e.g., roadways, bridges, utilities, and communications systems); and critical facilities (e.g., shelters, hospitals, police, and fire stations).</li> <li>Information on proposed buildings, infrastructure, and critical facilities, including planned and approved development, may be based on information in the comprehensive or land use plan and zoning maps.</li> <li>Identify buildings, infrastructure, and critical facilities that are vulnerable to more than one hazard.</li> <li>Describe the process or method used for identifying future buildings, infrastructure, and critical facilities.</li> <li>Note any data limitations for determining the type and numbers of future buildings, infrastructure, and critical facilities and include in the mitigation strategy actions for collecting the data to improve future vulnerability assessment efforts.</li> </ul> <p>For a discussion on identifying vulnerable structures and</p>	✓	

Jurisdiction: City of Darwin, Iowa

		detailed inventories, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 3, Worksheet #3a and #3b, Inventory Assets.		
			SUMMARY SCORE	✓

## Assessing Vulnerability: Estimating Potential Losses

**Requirement §201.6(c)(2)(ii)(B):** *[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate ... .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan estimate <b>potential dollar losses</b> to vulnerable structures?	Hazard Analysis P. 3 - 17	<p><b>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</b></p> <p>The plan provides an estimate for a flash flood event (P. 4), but does not provide an estimate of the potential dollar losses for the areas affected by flash flooding. For all other hazards, there is an asset inventory (P. 19) showing the value of all assets in the jurisdiction, but no estimate of how much might be affected by any of the listed hazards.</p> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>Describe vulnerability in terms of potential dollar losses.</li> </ul> <p><b>Additional Suggestions:</b></p> <ul style="list-style-type: none"> <li>Provide an estimate for each identified hazard.</li> <li>Include, when resources permit, estimates for structure, contents, and function losses to present a full picture of the total loss for each building, infrastructure, and critical facility.</li> <li>Select the most likely event for each identified hazard (e.g., 100-year flood) and estimate the likely losses associated with this event.</li> <li>Include a composite loss map to locate high potential loss areas to help the jurisdiction focus its mitigation priorities.</li> <li>Note any data limitations for estimating losses and include in the mitigation strategy actions for collecting the data to improve future loss estimate efforts.</li> </ul>	✓	

Jurisdiction: City of Darwin, Iowa

		For a step-by-step method for estimating losses, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 4.		
B. Does the plan describe the <b>methodology</b> used to prepare the estimate?	Not in the Plan	<p><b>Note: A “Needs Improvement” score on this requirement will not preclude the plan from passing.</b></p> <p>No estimate is included.</p> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>Describe the methodology used to estimate losses.</li> </ul> <p>For a step-by-step method for estimating losses, see <i>Understanding Your Risks</i> (FEMA 386-2), Step 4.</p>	✓	
SUMMARY SCORE			✓	

## Assessing Vulnerability: Analyzing Development Trends

**Requirement §201.6(c)(2)(ii)(C):** [The plan *should* describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan describe land uses and development trends?	Not in the Plan	<p><b>Note: A “Needs Improvement” score on this requirement will not preclude the plan from passing.</b></p> <p>No discussion of land use and development trends was found.</p> <p><b>Recommended Revisions:</b></p> <ul style="list-style-type: none"> <li>Provide a general overview of land uses (e.g., location and kind of use).</li> <li>Describe development trends occurring within the jurisdiction (e.g., describe the types of development occurring, location, expected intensity, and pace by land use).</li> </ul> <p><b>Additional Suggestions:</b></p> <ul style="list-style-type: none"> <li>Describe existing land use and densities in the identified hazard areas. Provide a map showing land use.</li> <li>Describe future land use density. Such information may be</li> </ul>	✓	

Jurisdiction: City of Darwin, Iowa

		<p>obtained from your regional or local planning office, comprehensive plan, or zoning maps. Future development information helps to define appropriate mitigation approaches, and the locations in which these approaches should be applied. This information can also be used reduce development in hazard areas.</p> <ul style="list-style-type: none"> <li>• Overlay a land use map with identified hazard areas.</li> <li>• Note any data limitations for determining development trends and include in the mitigation strategy actions for collecting the data to complete and improve future vulnerability assessment efforts.</li> </ul>		
SUMMARY SCORE			✓	

## Multi-Jurisdictional Risk Assessment

**Requirement §201.6(c)(2)(iii):** For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?				
SUMMARY SCORE			N/A	N/A